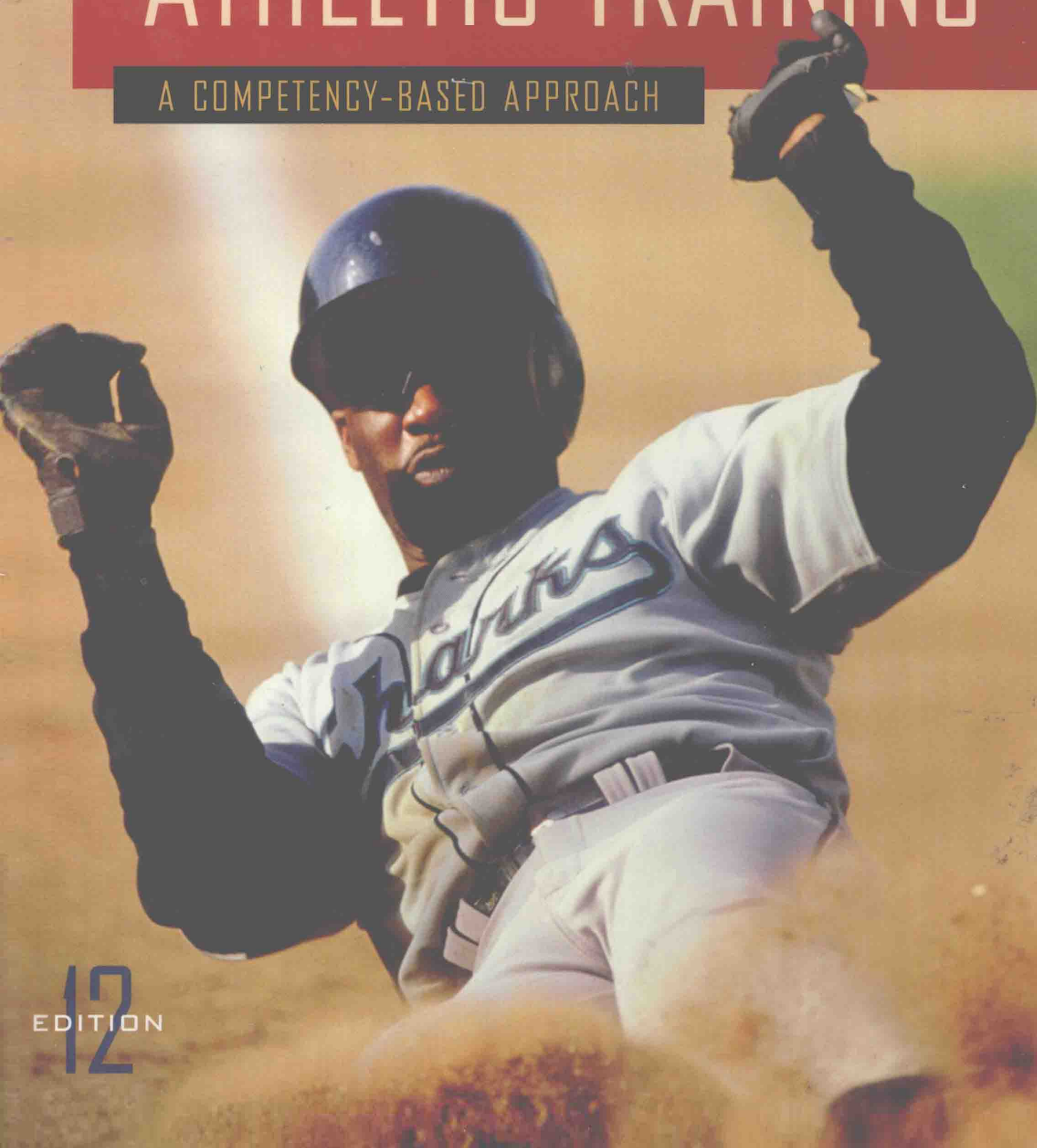


WILLIAM E. PRENTICE

ARNHEIM'S PRINCIPLES OF
ATHLETIC TRAINING

A COMPETENCY-BASED APPROACH



12
EDITION

arnheim's principles of
Athletic Training
A Competency-Based Approach

twelfth edition

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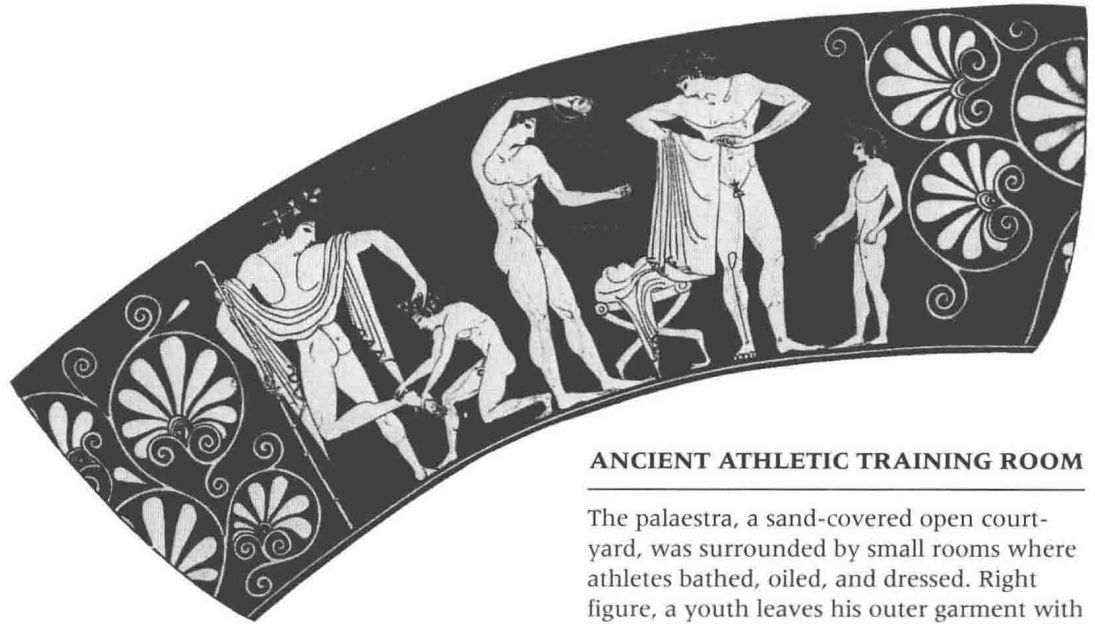
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arnheim's principles of
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A Competency-Based Approach

twelfth edition




ANCIENT ATHLETIC TRAINING ROOM

The palaestra, a sand-covered open courtyard, was surrounded by small rooms where athletes bathed, oiled, and dressed. Right figure, a youth leaves his outer garment with an attendant; center figure, a competitor oils his body before entering the palaestra; left figure, an attendant removes a thorn from an injured athlete.

Remembering a Legacy



Our longtime author and friend, Daniel D. Arnheim, passed away April 11, 2000. Dr. Arnheim authored numerous textbooks in athletic training, as well as in elementary physical education, motor development, and adapted physical education. Among his most recognizable titles is *Principles of Athletic Training*, which is used by most students going into the field of athletic training, as well as *Essentials of Athletic Training*, which is used by physical education majors and coaching students.

Today, Dr. Arnheim is a legend among men and women who call themselves athletic trainers. For nearly 40 years, anyone who has taken an athletic training course has used one of his textbooks at one time or another. Any of the athletic trainers in the United States as well as throughout the world will recognize his name. He always focused on the needs of students and instructors who would use his books. He cared very much about the professional growth of students, as they hold the keys to the future of his chosen professions—education and athletic training. Dr. Arnheim touched the lives of the thousands of students and athletic trainers through the words in his books and helped to shape the growth and the direction of athletic training as a profession. His impact as an athletic training educator will be missed. 


William E. Prentice
The Publishers

A Tribute to a Legend

In 1971, as a college sophomore at the University of Delaware, I took a required course that dealt with athletic injuries. At the time, I was a two-sport athlete who had sustained a couple of injuries and so, unlike many of the courses I had taken to that point in my college experience, I had at least a little interest in this course and in the material being presented. The textbook that we were required to buy for this class was the second edition of a book called *Modern Principles of Athletic Training* written by Karl Klafs and Dan Arnheim. As I sit here writing this, I am holding the copy of that book in my lap. Who would have ever guessed that almost 30 years later I would be coauthoring this textbook with Dan Arnheim?

Dan Arnheim was a living legend among men and women who call themselves athletic trainers. Over the past 30 years just about everyone who has taken an athletic training class has used one of his textbooks. I doubt seriously that there is any one of the 30,000+ athletic trainers in this country and throughout the world—from the youngest students to the old retirees—who would not recognize Dan Arnheim's name. He has literally touched tens of thousands of lives through the words in his books and he has helped to shape the growth and forge the direction of an entire profession. How many of us would love to be able to claim that we had that kind of an impact?

I joined him as coauthor on the *Principles of Athletic Training* book for the 8th edition in 1993. It didn't take me long to realize how incredibly intelligent Dr. Arnheim was. It became readily apparent to me that he had already forgotten more than I knew. Nevertheless, he allowed me to become a part of what had been his passion for more than 20 years, and for that I will always be grateful and indebted to him.

In my last conversations with him before he passed away in April of 2000, he was telling me that his involvement in the next edition of our book would be minimal. I assured him that I would do my best to continue with the high standards that he had set for us in our partnership to which he simply replied, "I know you will." So my charge from Dr. Arnheim is clear. Whether anyone can come close to the standard of excellence he established for us all is debatable. After all how many of us will ever be a "legend"? 

William E. Prentice

Since the first edition of this text was published in 1963, the profession of athletic training has experienced amazing growth, not only in numbers but also in the associated body of knowledge. During those years, the authors of this text have taken it as a personal responsibility to provide the reader with the most current research-based and clinically based information available in athletic training and sports medicine. This text has always been considered by many as the leading text in this field.

In the eleventh edition, the title of this text was changed to *Arnheim's Principles of Athletic Training: A Competency-Based Approach*, to honor the legacy of Dr. Daniel Arnheim, the longtime author of this text. The changes and additions in this twelfth edition are a reflection of my commitment and passion towards continuing Dr. Arnheim's tradition.

The essential philosophy of this edition remains the same as in past editions. The text is designed to lead the student from general foundations to specific concepts relative to injury prevention, evaluation, management, and rehabilitation. As the student progresses from beginning to end, he or she will gradually begin to understand the complexities of the profession of athletic training. As in past editions, a major premise is that the student should be able to apply the appropriate techniques and concepts in the day-to-day performance of his or her job.

ADDRESSING THE ATHLETIC TRAINING EDUCATIONAL COMPETENCIES

Since 1998, the Education Council, established by the National Athletic Trainers' Association, has taken the responsibility for identifying the knowledge and skills that must be included in educational programs preparing students to enter the athletic training profession. The Education Council developed a list of educational competencies and clinical proficiencies categorized according to twelve domains that comprise the role of the athletic trainer. The athletic training educational programs that are accredited by CAAHEP (by the JRC-AT beginning in 2006), as well as those seeking accreditation, must integrate the extensive list of educational competencies and clinical proficiencies into their curriculums. This move toward competency-based athletic training education programs enhanced the need for a comprehensive text for athletic training students. My goal in this twelfth edition, as in the eleventh edition, was to make certain that each and every one of the educational competencies and clinical proficiencies identified by the Education Council is specifically covered at some point in this text.

It was suggested that including in this textbook a complete listing of all the educational competencies and clinical proficiencies and an index of the page number where that specific competency or proficiency is discussed would provide an excellent, logical, and useful resource for both the instructor and the athletic training student. Unfortunately, copyright laws prevented us from reproducing the *Athletic Training Educational Competencies* in this text. However, the McGraw-Hill web site at www.mhhe.com provides an index of where each and every educational competency and clinical proficiency is discussed in this textbook.

WHO IS IT WRITTEN FOR?

Arnheim's Principles of Athletic Training: A Competency-Based Approach should be used by athletic trainers in courses concerned with the scientific and clinical foundations of athletic training and sports medicine. Practicing athletic trainers, physical therapists, and other health care professionals involved with physically active individuals will also find this text valuable.

WHAT IS NEW IN THIS EDITION?

As in previous editions, developing the twelfth edition included serious consideration and incorporation of suggestions made by students, as well as detailed feedback from reviewers and other respected authorities in the field. Consequently, this twelfth edition reflects the major dynamic trends in the field of athletic training and sports medicine. Furthermore, it is my hope that this newest edition will help prepare students to become competent professionals who will continue to enhance the ongoing advancement of the athletic training profession.

In addition to the inclusion of material that addresses specific competencies, this newest edition has undergone extensive changes in content. The changes and additions are reflective of the ever-increasing body of knowledge that is expanding the scope of practice for the athletic trainer.

The chapters have been reorganized into six sections: Professional Development and Responsibilities, Risk Management, Pathology of Sports Injury, Management Skills, Musculoskeletal Conditions, and General Medical Conditions. A detailed listing of new and updated content follows:

Chapter 1: The Athletic Trainer and the Sports Medicine Team

- Expanded discussion of the recent history and development of NATA
- Added addresses of additional sports medicine organizations
- Added new position statements and guidelines for sports medicine organizations
- Added information on the National Academy of Sports Medicine
- Updated the performance domains for the 2004 Role Delineation Study
- Expanded section on dealing with an athlete's parents
- Introduced HIPAA
- Expanded the discussion of a coach's responsibilities on the sports medicine team
- Expanded the list of support personnel
- Added information on the NCAA recommendations for expanding coverage by athletic trainers
- Added information on employment settings in the military and as physician extenders
- Discussed transition of JRC-AT and the move from CAAHEP to CHEA
- Discussed name change from NATABOC to simply BOC
- Added information on specialty certifications (Certificates of Added Qualification)
- Updated requirements for certification post internship route
- Updated information on state-by-state regulation of the athletic trainer
- Expanded the discussion of future directions for the athletic training profession

Chapter 2: Health Care Administration in Athletic Training

- Added new focus box on sections to include in a policies and procedures manual
- Added a new design for a small athletic training room
- Added new information on HIPAA and FERPA and maintaining confidentiality in record keeping
- Expanded section on the use of computers in an athletic training setting
- Updated classification of sports table

Chapter 3: Legal Concerns and Insurance Issues

- Updated language in section on torts
- Expanded section on product liability
- Expanded descriptions of third-party payers
- Updated billing code procedures
- Added new table on numerical billing codes used by athletic trainers
- Added new focus box on guidelines for documentation

Chapter 4: Training and Conditioning Techniques

- Added new information on motion restriction due to tightness of neural tissue
- Redefined and clarified ballistic versus dynamic stretching techniques
- Added new information on stretching of tight neural structures
- Added new information on stretching of fascia
- Added new information on alternative stretching techniques including Pilates and yoga
- Expanded information on improving neuromuscular function in the early stages of weight training
- Revised information on spotting techniques and power lifts
- Added new information on strength training in adolescents

Chapter 5: Nutritional Considerations

- Added new information on transfatty acids
- Added new information on Dietary Reference Intakes
- Updated information on the Food Pyramid
- Added new section on ephedrine
- Added new section on hydrostatic weighing and bioelectrical impedance
- Added new section on low carbohydrate diets and weight loss
- Expanded section on disordered eating
- Added new information on anorexia athletica

Chapter 6: Environmental Considerations

- Added new focus box on factors that influence sweat rate
- Updated information on exertional heat illnesses
- Added new NATA recommendations for preventing heat illness
- Added new focus box on guidelines that should be followed during an electrical storm
- Added new information on lightning detectors

Chapter 7: Protective Gear and Sports Equipment

- Added new focus box on guidelines for selecting, purchasing, and fitting protective sports equipment to help minimize liability
- Added new information on equipment reconditioning and recertification
- Added new information on the Revolution football helmet
- Added new information on soccer headgear
- Updated photos of equipment
- Added new information on shoe lacing techniques

Chapter 9: Mechanisms and Characteristics of Sports Trauma

- Expanded information on myofascial trigger points

Chapter 10: Tissue Response to Injury

- Added new information on unidimensional and multidimensional pain assessment tools

Chapter 11: Psychosocial Intervention for Sports Injuries and Illnesses

- Added new practical suggestions on the athletic trainer's role in providing social support to an injured athlete
- Added new information on the emotional and psychological effects of an athlete's injury upon the athletic trainer

Chapter 12: On-the-Field Acute Care and Emergency Procedures

- Updated and added new information on the emergency action plan

- Added an example of a consent form for medical treatment of minors
- Updated information about equipment removal
- Updated information on CPR techniques
- Expanded information on use of AEDs
- Added information on the ACUD and AVPU level of consciousness scales
- Updated information on pool extraction techniques

Chapter 13: Off-the-Field Injury Evaluation

- Added new information on differential diagnosis
- Added new table on standard abbreviations used in medical documentation
- Added new information on arteriograms, venograms, and Doppler ultrasonography

Chapter 14: Bloodborne Pathogens

- Added new information on hepatitis C
- Added new information on using nonlatex gloves

Chapter 15: Using Therapeutic Modalities

- Added new information on ensuring athlete privacy
- Updated information on all modalities
- Added new information on Cryo-Cuff and Game Ready systems
- Added new information on extracorporeal shock wave therapy

Chapter 16: Using Therapeutic Exercise in Rehabilitation

- Added new information on the RAMP system of rehabilitation
- Added new aquatic therapy workout

Chapter 17: Pharmacology, Drugs, and Sports

- Updated information on new medications throughout
- Updated the NCAA banned substance list
- Added new information on THG

Chapters 18 through 25 cover specific musculoskeletal injuries to regional areas of the body. These chapters have been expanded to include new information and are now as comprehensive as possible within the scope of practice in athletic training. Each body region has been organized to include sections on anatomy, prevention, assessment, management of specific injuries, and rehabilitation (when appropriate). Each injury identified consistently discusses the associated etiology, symptoms and signs, and management. Coverage of rehabilitation techniques includes suggestions for general body reconditioning, joint mobilization, flexibility exercises, muscular strength, neuromuscular control, functional progressions (when appropriate), and guidelines for return to activity.

Chapter 18: The Foot

- Revised and updated information on normal gait patterns
- Added new information on subungual hematoma
- Added new information on incorporating exercise sandals into the rehabilitation program

Chapter 19: The Ankle and Lower Leg

- Incorporated new information on rehabilitation of ankle sprains

Chapter 20: The Knee and Related Structures

- Added new information on modified Lachman tests

Chapter 21: The Thigh, Hip, Groin, and Pelvis

- Revised information on femoral fractures
- Revised information on femoral stress fractures
- Included new photos for femoral retroversion and anteversion

Chapter 22: The Shoulder Complex

- Added new section on O'Brien's active compression test
- Added new focus box on throwing progressions

Chapter 23: The Elbow

- Added new information on Panner's disease
- Updated information on medial and lateral epicondylitis
- Updated information on Volkmann's contracture

Chapter 24: The Forearm, Wrist, Hand, and Fingers

- Added new information on Madelung deformity
- Updated information on triangular fibrocartilage complex

Chapter 25: The Spine

- Corrected information on spinal cord shock and cervical cord neuropraxia
- Added new information on the methods for measuring spinal stenosis
- Updated information about brachial plexus injury

Chapter 26: The Head, Face, Eyes, Ears, Nose, and Throat (formerly Chapter 27)

- Updated and expanded discussions of concussion and mild head injury
- Added new focus box on guidelines for physician referral following concussion
- Added new focus box on home instructions for concussions
- Updated information on malignant brain edema syndrome
- Updated information on subdural hematoma
- Updated information on migraine headaches
- Added new information on Le Fort fractures
- Added new photos for ear examination
- Added new photos for eye examination

Chapter 27: The Thorax and Abdomen (formerly Chapter 26)

- Updated information on bowel sounds in auscultation
- Added new techniques for managing scrotal contusion
- Added new information on commotio cordis

Chapter 28: Skin Disorders

- Added new information on when to use sutures
- Added new information on pityriasis rosea
- Added new information on spider bites
- Added new focus box on wound care
- Added new focus box on managing blisters
- Added new photos of various dermatologic conditions

Chapter 29: Additional General Medical Conditions

- Updated information on hypertension

Critical Thinking Exercises

Critical Thinking Exercises, including 29 new exercises, are presented in every chapter and provide brief case studies that help the student apply the content just studied. Solutions for each case are included at the end of each chapter.

PEDAGOGICAL AIDS

Numerous pedagogical tools are included in this edition:

- **Chapter objectives** Goals begin each chapter to reinforce important key concepts to be learned.
- **Margin information** Key concepts, selected definitions, helpful training tips, and illustrations are placed in the margins throughout the text for added emphasis and ease of reading and studying.
- **Anatomy** Where applicable, extensive discussion of anatomy is presented and illustrated throughout the text.
- **Focus boxes** Important information is highlighted and boxed to make key information easier to find and to enhance the text's flexibility and appearance.
- **Critical Thinking Exercises** 244 brief cases studies are now included that encourage the student to apply the content presented to the clinical setting.
- **Color throughout text** A second color is used throughout the text to accentuate and clarify illustrations and textual material.
- **New photographs and line drawings** Approximately 75 new or replacement photographs and color line drawings have been added.
- **Color illustrations** 24 full-color photographs are included in Chapter 28 to depict common skin disorders.
- **Management plans** In selected chapters, sample management plans are presented as examples of treatment procedures.
- **Chapter summaries** Each chapter's salient points are summarized to reinforce key content.
- **Review questions and class activities** Located at the end of each chapter, review questions and class activities are provided to enhance the learning process.
- **References** References have been extensively updated to provide the most complete and current information available.
- **Annotated bibliography** For students and instructors who want to expand on the information presented in each chapter, an annotated bibliography has been provided.
- **Glossary** An extensive list of key terms and their definitions is presented to reinforce information in one convenient location.
- **Appendixes** The appendixes contain NATA's Code of Ethics, Canada's Food Guide for Healthy Living and the Recommended Nutrient Intake (RNI), Blood-borne Pathogen Guidelines, Helmet Removal Guidelines, Fluid Replacement Guidelines, Lightening Safety Guidelines, Emergency Planning, and a sample resume. New appendixes include NATA position statements on Exertional Heat Illnesses, Management of Sport-Related Concussion, and commotio cordis.
- **End pages** Front and back end pages inside the covers of the text provide helpful lists of suggested supplies for the athletic training room and the athletic trainer's kit, along with charts for metric and celsius conversions.

INSTRUCTOR'S RESOURCE MATERIALS

Course Integrator Guide

Formerly the Instructor's Manual, this guide was prepared by Terri Jo Rucinski, M.A., ATC, P.T. from the University of North Carolina. It includes all the useful features of an Instructor's Manual, including learning objectives, brief chapter overviews, key terminology, discussion questions, class activities, worksheets and the accompanying answer keys, media resources, and Web links. It also integrates the text with image clips and all the health and human performance resources McGraw-Hill offers including the Online Learning Center. The guide also includes references to relevant print and broadcast media.

Test Bank

The test bank includes approximately 2,000 examination questions. Each chapter contains true-false, multiple choice, and completion test questions. The worksheets in

each chapter also include a separate test bank of matching, short answer, listing, essay, and personal or injury assessment questions that can be used as self-testing tools for students or as additional sources for examination questions.

Computerized Test Bank CD-ROM

McGraw-Hill's EZ Test is a flexible and easy-to-use electronic testing program. The program allows instructors to create tests from book specific items. It accommodates a wide range of question types and instructors may add their own questions. Multiple versions of the test can be created, and any test can be exported for use with course management systems such as WebCT, BlackBoard or PageOut. The program is available for Windows and Macintosh environments.

PowerPoint Presentation

Developed for the twelfth edition by Jason Scibek, M.A., ATC, of Eastern Michigan University, a comprehensive and extensively illustrated PowerPoint presentation accompanies this text for use in classroom discussion. The PowerPoint presentation may also be converted to outlines and given to students as a handout. You can easily download the PowerPoint presentation from the Online Learning Center at www.mhhe.com/prentice12e. Adopters of the text can obtain the login and password to access this presentation by contacting your local McGraw-Hill sales representative.

Resource Presentation Manager (RPM)

This is a CD-ROM presentation tool of book-specific images designed to engage students and promote critical thinking and dialogue on the most relevant topics in athletic training. Images can be searched by table of contents, key word, or type.

INTERNET RESOURCES

Course Management Systems

www.mhhe.com/support

Now instructors can combine their McGraw-Hill Online Learning Center with today's most popular course-management systems and/or McGraw-Hill's PageOut. The McGraw-Hill Online Learning Center has also been converted into a cartridge that can be used in most course management systems. Our Instructor Advantage program offers customers toll-free telephone support, and unlimited e-mail support. Instructors who use 500 or more copies of a McGraw-Hill textbook can enroll in our Instructor Advantage Plus program, which provides on-campus, hands-on training from a platform specialist. We have also built an interactive support site accessible to anyone with an Internet connection. Located at www.mhhe.com/support, you can ask questions of the prebuilt database, or e-mail a McGraw-Hill specialist. Consult your McGraw-Hill sales representative to learn what other course management systems are easily used with McGraw-Hill online materials.

Online Learning Center

www.mhhe.com/prentice12e

This website offers resources to students and instructors. It includes downloadable ancillaries, Web links, student quizzes, additional information on topics of interest, and more. Resources for the instructor include:

- Downloadable PowerPoint presentations
- Lecture outlines
- Discussion questions
- Concept summaries

Resources for the student include:

- Flashcards
- Online chapter reviews
- Interactive quizzes
- PowerWeb

eSims

www.mhhe.com/esims

eSims is an online assessment tool that provides students with computerized simulation tests with instant feedback that emulate the actual Athletic Training certification exam. eSims is available with each new purchase of *Arnheim's Principles of Athletic Training*. (It is also available for purchase online too!) Check out eSims at the address above.

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my longtime developmental editor, Michelle Turenne, who, as always, provided invaluable guidance throughout the development of this edition. Her input and dedication to this project have been indispensable. Michelle has left McGraw-Hill, and I cannot thank her enough for her friendship over the years. She will always be an important part of the fabric of this text.

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William E. Prentice